Onset of deformation in neutron-rich Kr isotopes at ISS, ISOLDE, CERN

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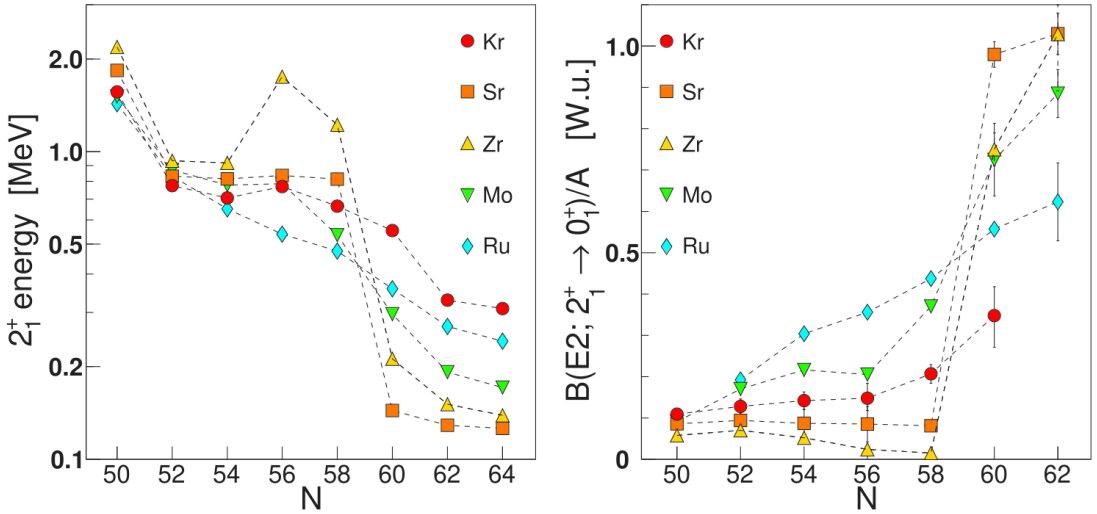
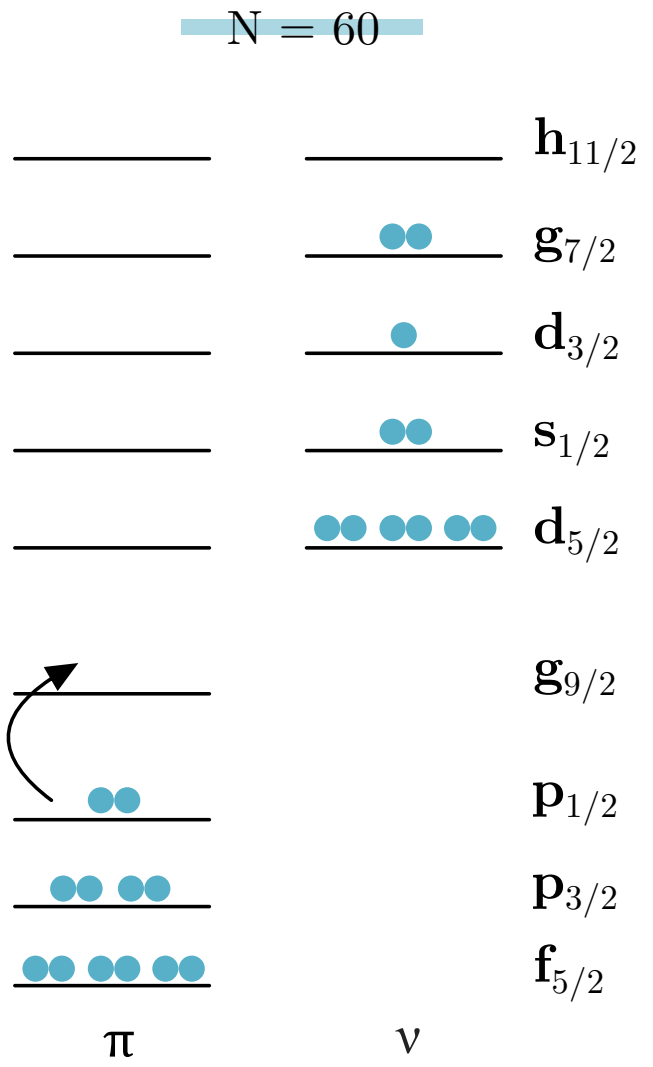
Onset of deformation in neutron rich Kr isotopes

- Zr, Sr – dramatic shape change
- Kr – smooth shape change
- Shell evolution

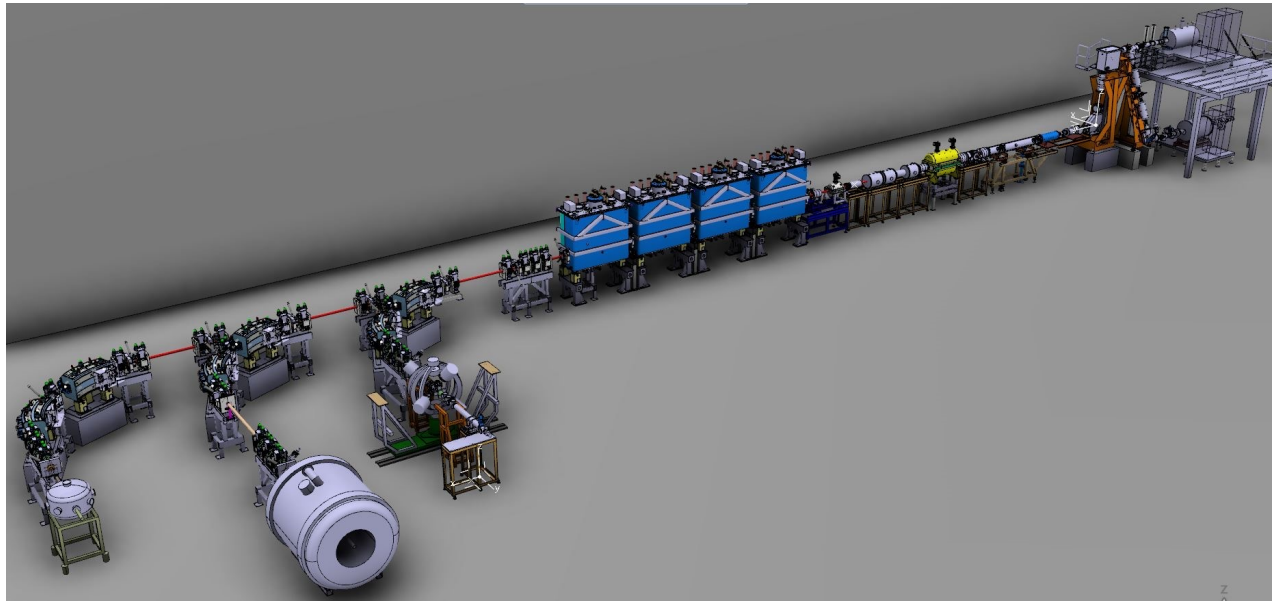


P. E. Garrett, M. Zielinska, and E. Clement, Prog. Part. Nucl. Phys. **163**, 103931 (2021).

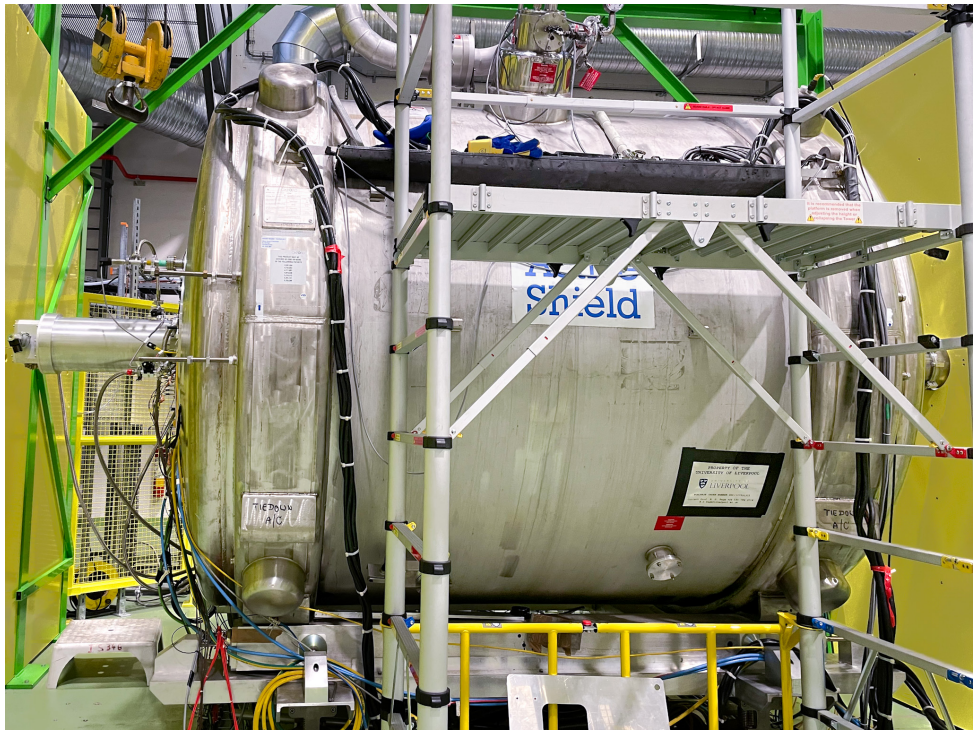


ISS at HIE-ISOLDE, CERN

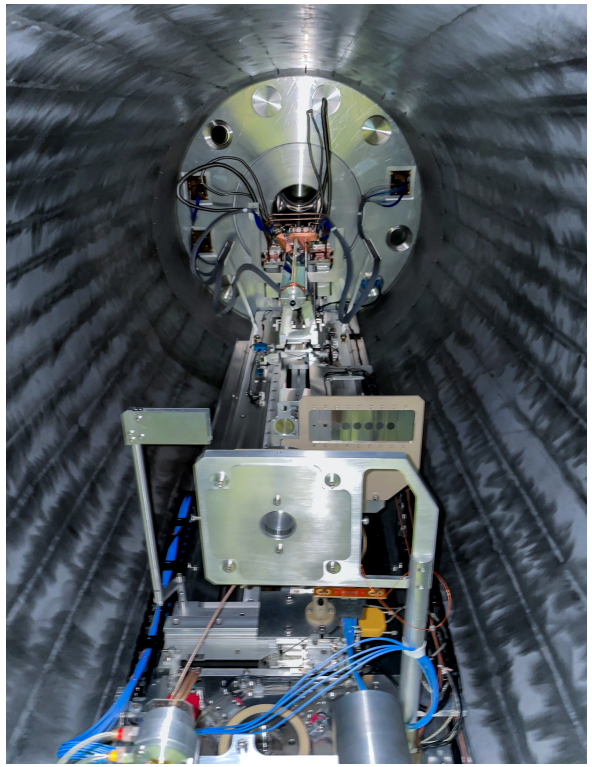
HIE-ISOLDE beam line



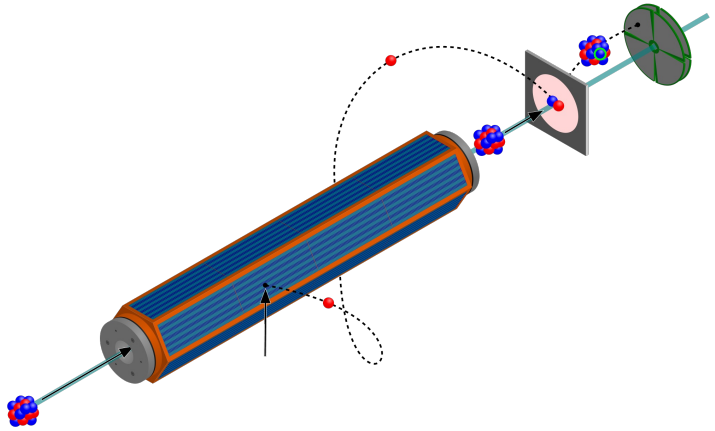
ISOLDE Solenoidal Spectrometer (ISS)

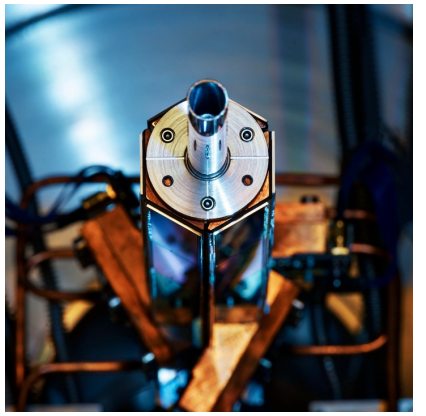


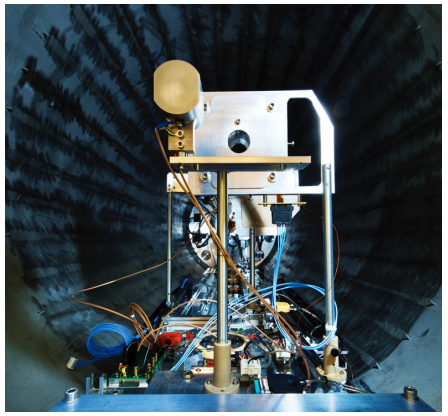
Inside ISS

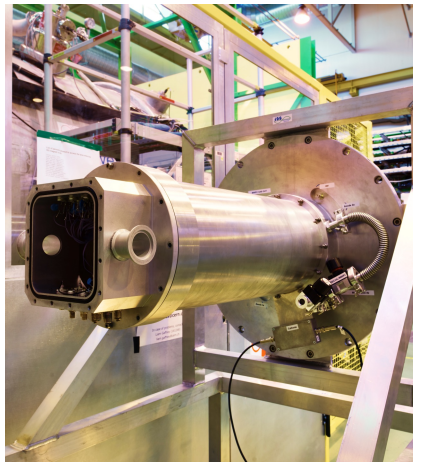


- Silicon array
- Target ladder - CD_2 targets
- Luminosity detector
- Recoil detector (Si or gas)





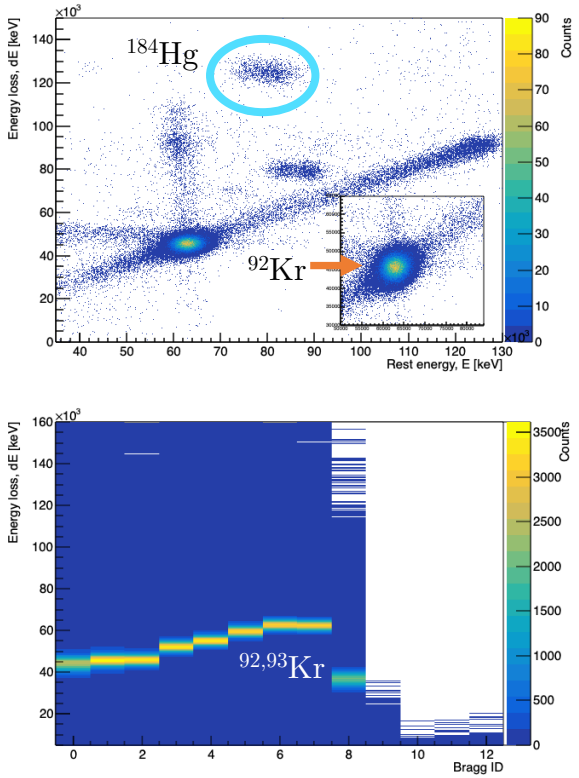




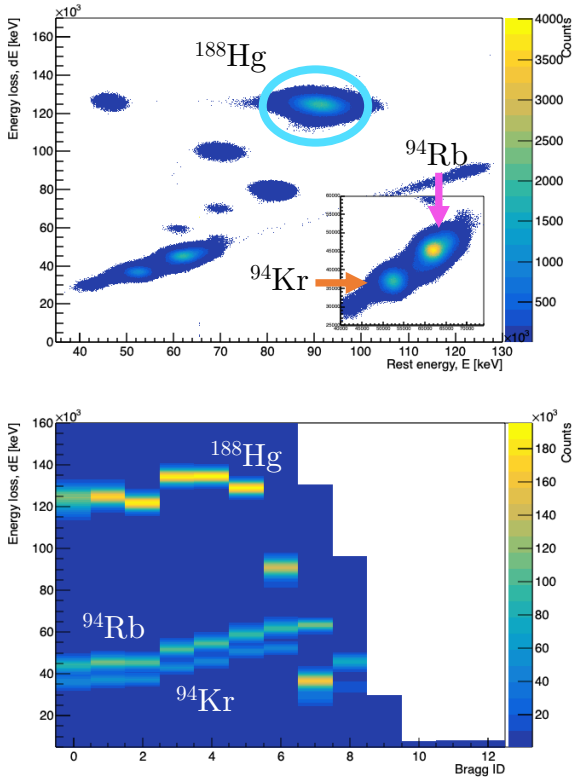
The $^{92,94}(d,p)$Kr experiment

- October 2022
- Ion source efficiency lower than expected
- Unable to observe the ^{94}Kr $(d,p)^{95}$Kr reaction
- Half lives
  - ^{92}Kr – 1.84 s
  - ^{94}Kr – 212 ms
  - ^{96}Kr – 80 ms

^{92}Kr beam composition

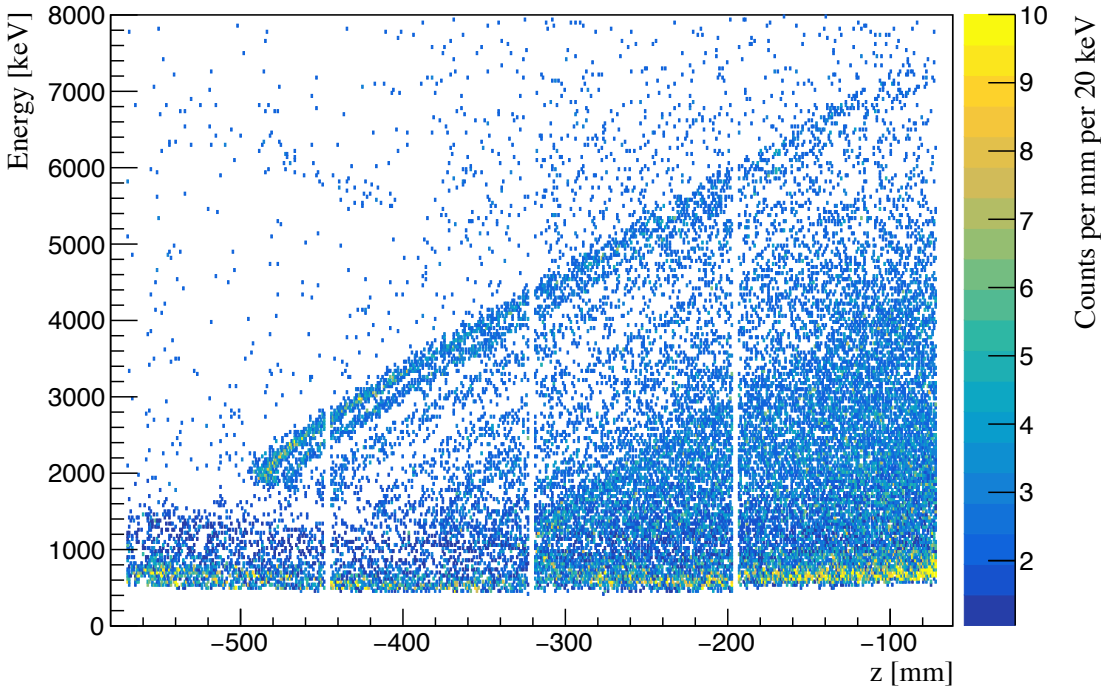


^{94}Kr beam composition

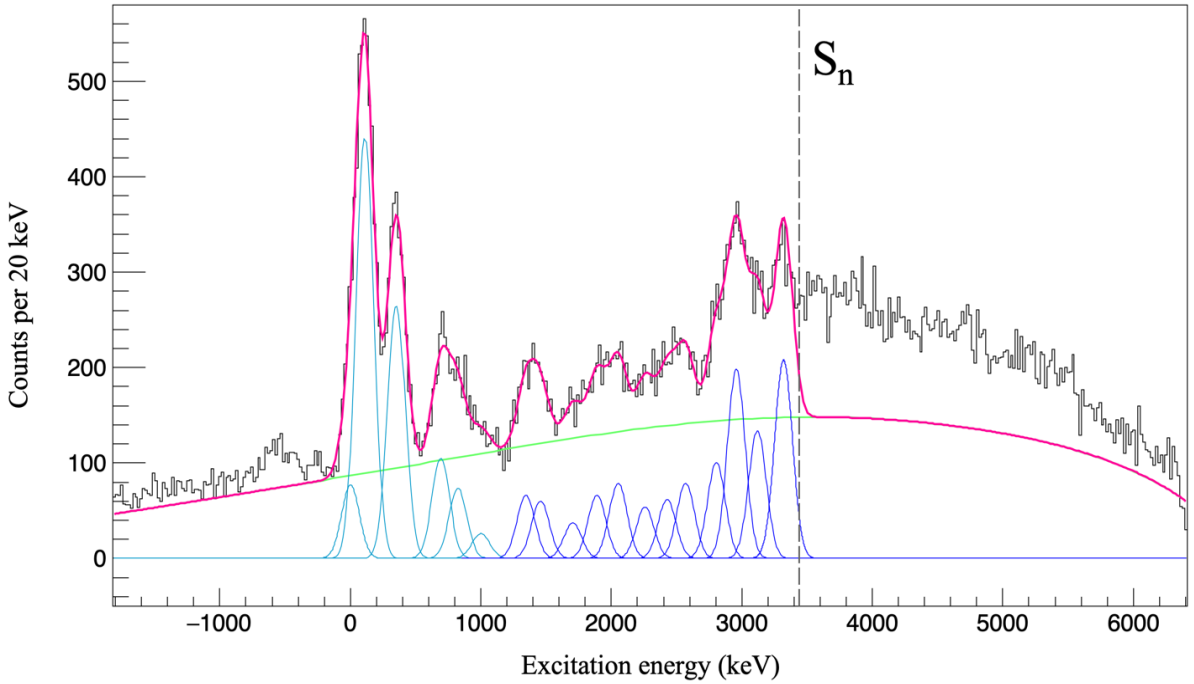


Excitation energy

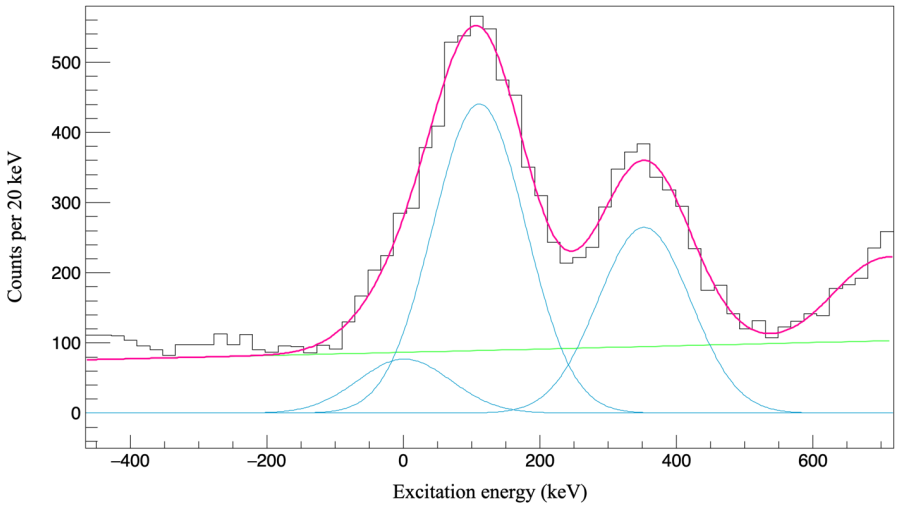
Proton energy vs position (on beam axis)

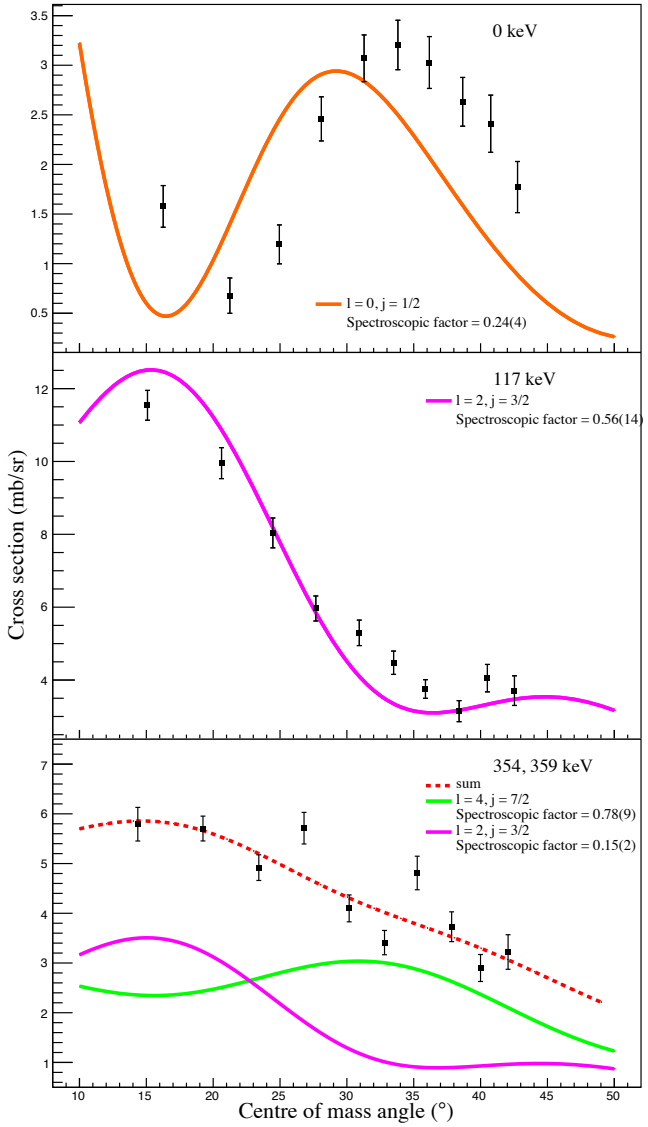


93Kr excitation energy spectrum

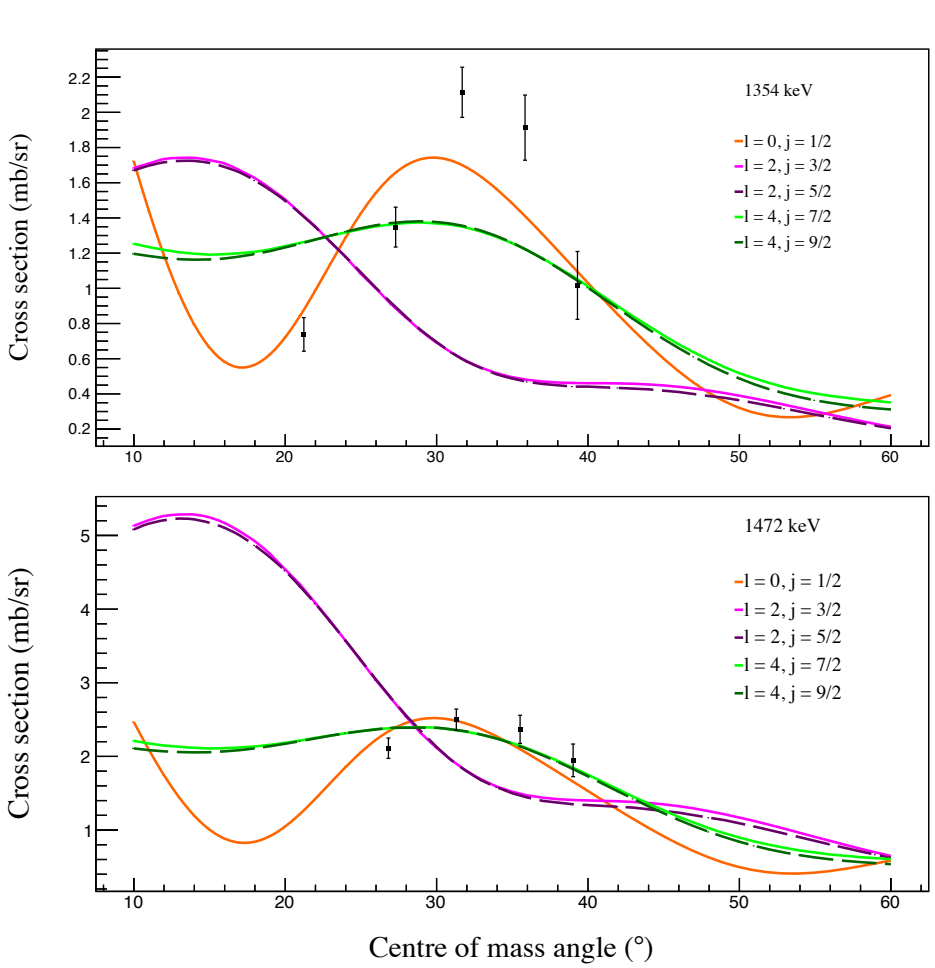


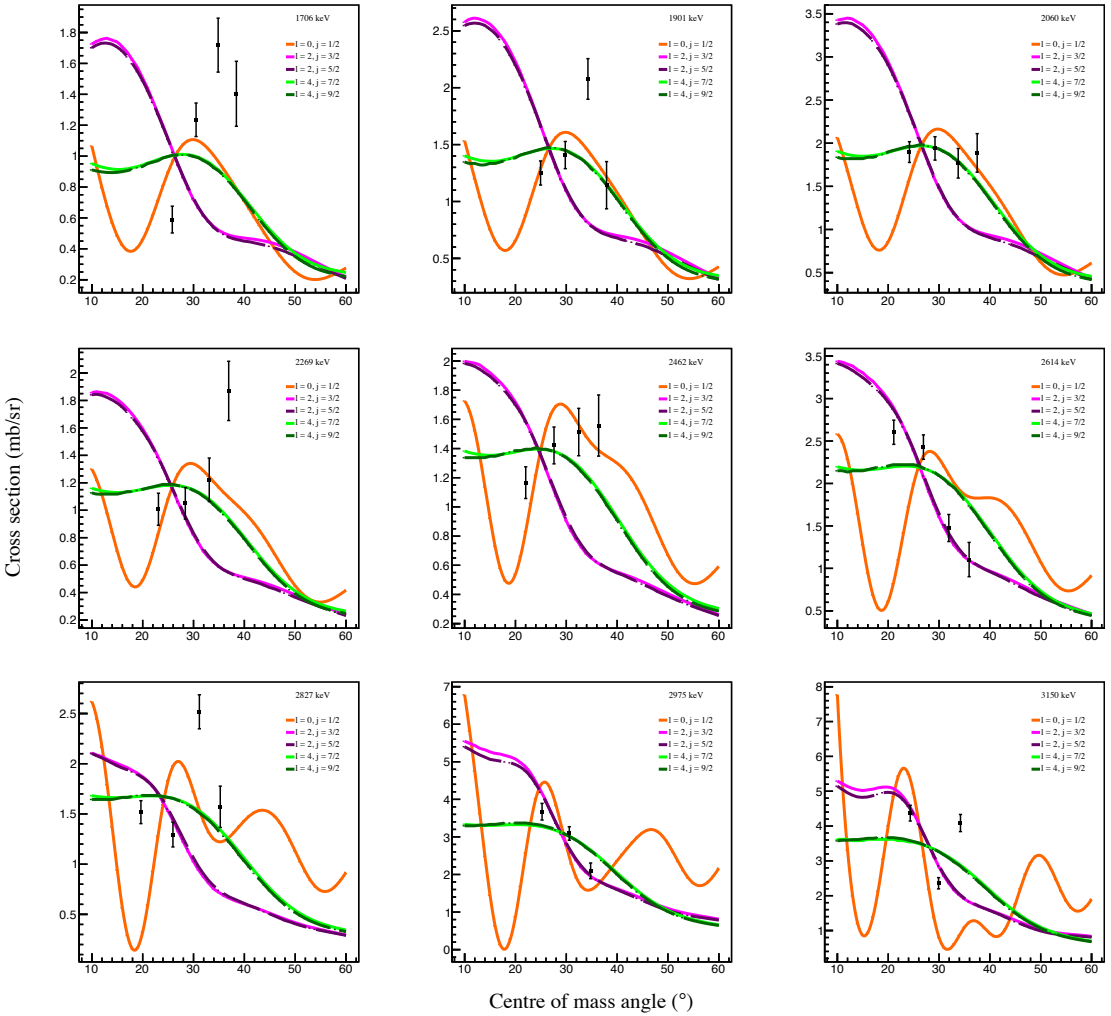
Angular distributions





Angular distributions





Future Work

- Compare to modern shell model calculations
- Compare spectroscopic factors to neighbouring isotones

- Measure ^{94}Kr$(d,p)^{95}$Kr reaction

Thank you

- Acknowledgments
  - STFC
  - ISS collaboration
  - ISOLDE technical group